QNAP SYSTEMS, INC.
Member of IEI Group

EvoStor-400CA

SCSI-to-ATA RAID Subsystem

User Manual

EvoStor-400CA

User Manual (Version 1.1)

This user manual (version 1.1) applies to EvoStor-400CA version 1.00 or later versions.
June 17, 2004

CUSTOMER SERVICE

To obtain service or technical support for your system, please refer to the registration card for information.

LIMITED WARRANTY

In no event shall the liability of QNAP Systems, Inc. exceed the price paid for the product from direct, indirect, special, incidental, or consequential software, or its documentation. QNAP offers no refunds for its products. QNAP makes no warranty or representation, expressed, implied, or statutory, with respect to its products or the contents or use of this documentation and all accompanying software, and specifically disclaims its quality, performance, merchantability, or fitness for any particular purpose. QNAP reserves the right to revise or update its products, software, or documentation without obligation to notify any individual or entity.

FCC STATEMENT

QNAP EvoStor-400CA has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used according to the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which is found by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and device.
- Connect the equipment to an outlet other than the receiver.
- Consult a dealer or an experienced radio/TV technician for assistance.

CAUTION

1. There is a danger of explosion if battery is incorrectly replaced.
2. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instruction.
3. Should you return any components of EvoStor-400CA package for refund or maintenance, make sure they are carefully packed for shipping. Any form of damages due to improper packaging will not be compensated.

Table of Contents

Chapter 1 EvoStor-400CA Overview

1.1 Introduction

RAID (Redundant Array of Inexpensive Disks) is a group of disk drives combined with two or more hard disks, accompanied with software and controller to provide a high performance of data transfer at relatively low cost. More and more users are employing RAID for disk configuration to obtain a high transfer rate of data as well as secure data protection. As two or more disks are used in RAID configuration, disk data can be stored and backed up more conveniently.

1.2 Product Overview

EvoStor-400CA (hereafter referred as EvoStor) external RAID system is designed to offer high performance, high reliability and low cost alternatives to SCSI to IDE RAID subsystems. It utilizes cost-effective IDE drives with simple storage setup and management process making it ideal for small to mid-sized companies and departments.

System Features

- Intel 64-bit RISC I/O Processor
- Built-in 128 MB cache memory, expandable up to 1 GB
- Compatible with all SCSI-3 and SCSI-2/LVD host adapters up to 160 MB/s
- LCD panel for easy RAID configuration and status monitoring
- EvoStor Management Technology: Windows-based utility monitors status of RAIDs through in-band SCSI command, enable remote management
- Supports up to 4 hot-swappable Ultra DMA 133 hard drives
- Local audible event notification buzzer
- Real time drive activity and status indicators
- Supports RAID levels 0, 1, 0+1, 3, 5 and NRAID
- Supports multiple logic volume creation, each logic volume could be configured as one RAID level independently
- Supports hot spare and automatic hot rebuild
- Transparent data transfer for all popular operating systems

1.3 Package Contents

EvoStor subsystem package contains the following items:

- EvoStor subsystem
- 68-pin SCSI 160 LVD cable
- SCSI terminator
- Power cord
- Quick installation guide
- Companion CD (user manual inclusive)

1.4 System Requirements

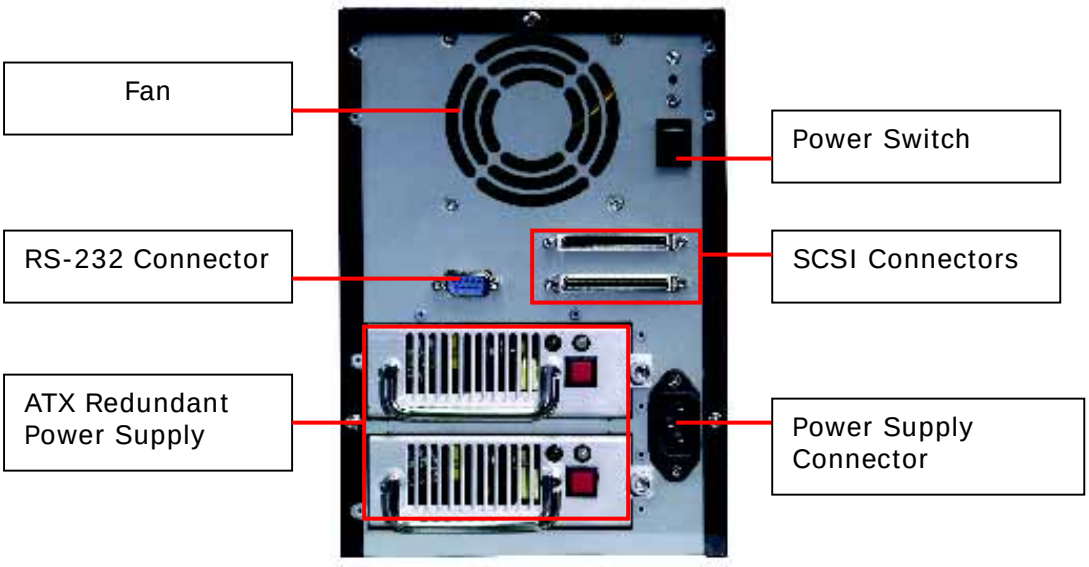
- An Ultra 160 SCSI host bus adaptor
- A personal computer installed with an O.S. that supports SCSI device access

Chapter 2 System Overview and Installation

2.1 System Overview

- **Front view**

- **Rear View**



2.2 Installation

Follow the steps below to install EvoStor system:

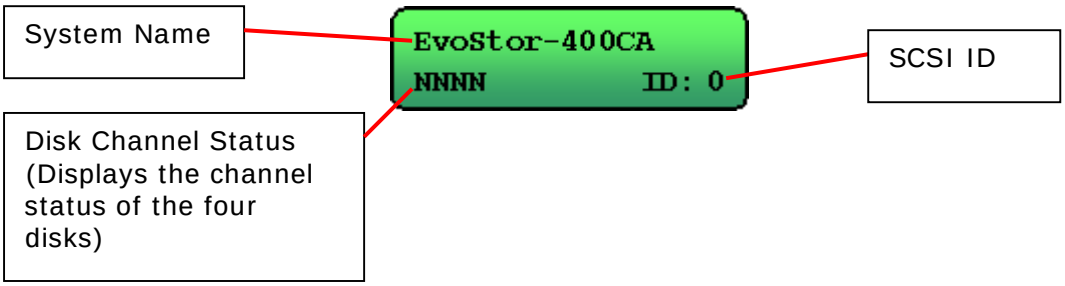
1. Unpack EvoStor package.

2. Install hard disk. (Skip this step if a hard disk is included in the package).

   Note: Set the jumper of the hard disk in Master mode before installation.

3. Connect the power cable.

4. Turn on EvoStor. Upon successful switching on of the system, the following message will be displayed on the LCD panel.



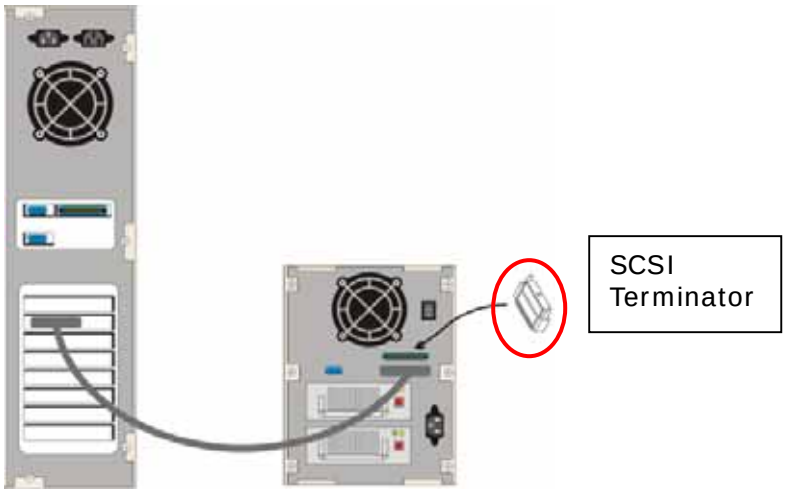
   Note: Please refer to Appendix C for further information on symbols of disk channel status.

5. Set the SCSI ID for EvoStor via the LCD panel if the ID duplicates with other SCSI devices.

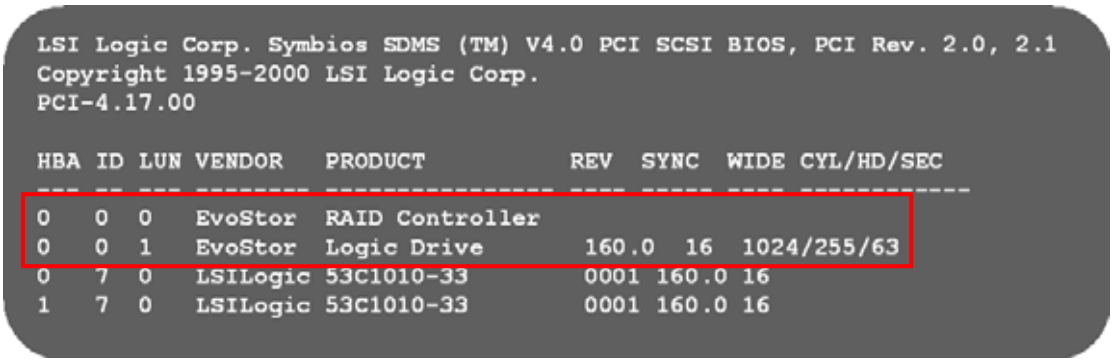
6. Create disk volume via the LCD panel. If you configure EvoStor as RAID 1, 0+1, 3, or 5, the percentage of initialization will be shown. Complete initialization before proceeding to step 7.

   Note: Please select LUN0 as the ID for this logic volume, as some O.S. are not able to recognize logic volume ID other than LUN0. For information about creating more than one logic volume, please contact the O.S. distributor. For more details on Steps 5 and 6, please refer to Chapter 3.1.2.

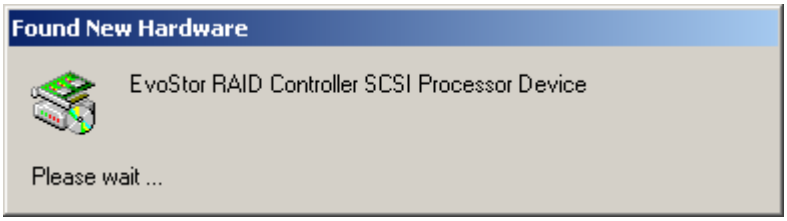
7. Connect a SCSI terminator to EvoStor. Then connect EvoStor to the host computer via a SCSI cable.



8. Turn on the host computer. In the startup screen of BIOS, it will be shown that EvoStor is detected. Note that if you create the logic volume on LUN0, EvoStor RAID Controller resided on LUN0 will not be shown.



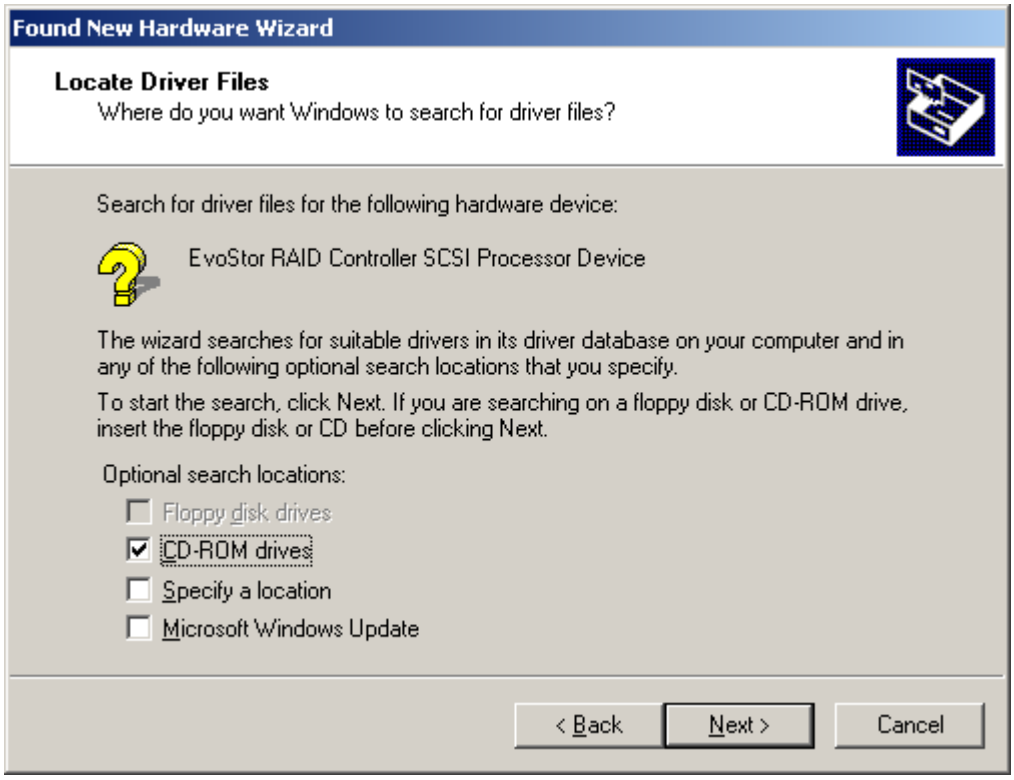
9. Skip the following steps if the above logic volume is resided on LUN0. After Windows starts, the Found New Hardware Wizard will appear.



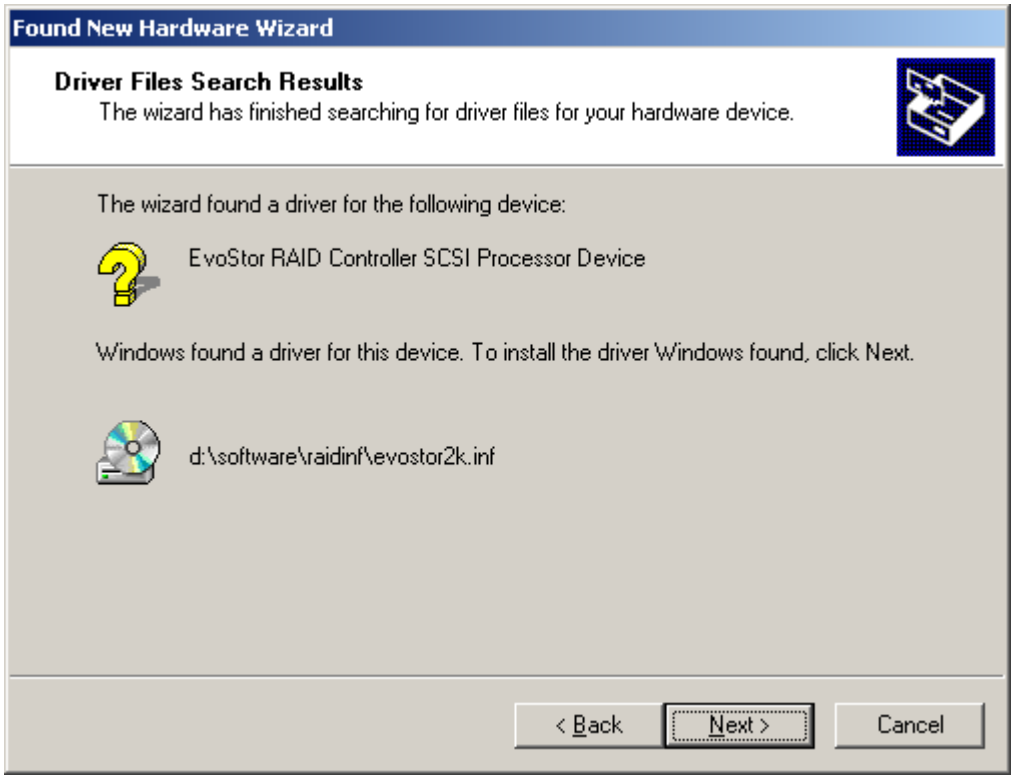
10. In the Found New Hardware Wizard dialog box, click **Next**.

11. Insert the companion CD and select “Search for a suitable driver for my device (recommended)”. Then click **Next**.

12. In Optional search locations, select CD-ROM drives and click **Next**.



13. The Found New Hardware Wizard will find the driver to install in the CD. Click **Next**.



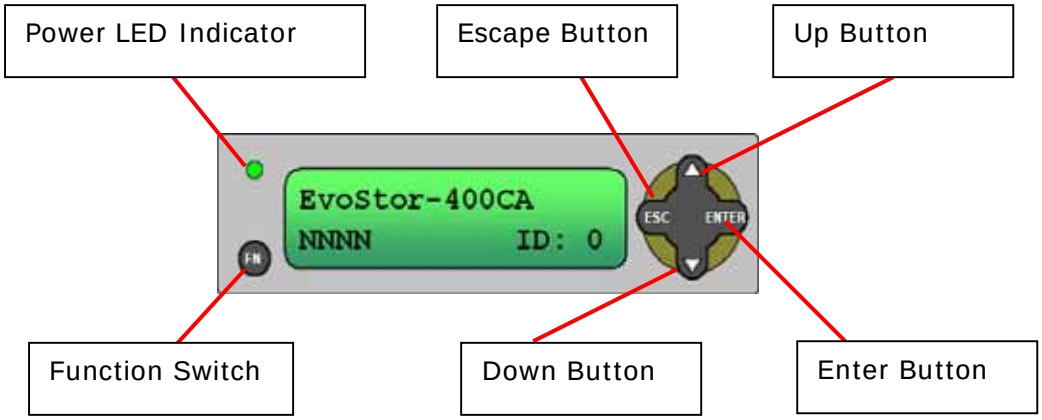
14. Click **Finish** to complete the installation. Format EvoStor before using the system.

For information on EvoStor management software installation, please refer to Chapter 3.2.

Chapter 3 System Configuration

3.1 Configuring EvoStor via the LCD panel

The buttons and LED indicators of the LCD panel are described as below:



- Up and Down buttons: To navigate up and down to select the appropriate function.
- Enter: To confirm the selection or enter a value.
- ESC: To return to the previous menu.
- Function switch: To enter system configuration menu.
- Power LED Indicator: The light will be on when power is connected.

3.1.1 System Messages

To view system messages of EvoStor, press enter when the system is successfully turned on. Then press the Up and Down buttons to select the information you want to view. After that, press ESC to return to the previous menu. The following information is available currently:

Field	Description
SCSI ID Info	Current SCSI ID of EvoStor
Volume Info	Available logic volume information
Disk Info	Physical disk model name and capacity
Hardware Status	System temperature, power and fan status
Firmware Version	Firmware version of EvoStor
Mute Beeper	Turn off the beeper of EvoStor

3.1.2 Configuring EvoStor

By factory default, the value of SCSI ID Set is 0 and the password is eight empty characters.

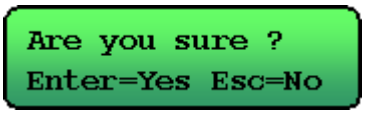
- **Configure SCSI ID Set**

  - Step 1
    Press the Function switch and the LCD panel will display the following information:

    Press the Enter button to proceed.

  - Step 2
    Use the Up and Down buttons to enter the password. The following message will then be shown:

    Press the Enter button to confirm or ESC button to return to the previous menu.

  - Step 3
    Use the Up and Down buttons to adjust the SCSI value and press the Enter button. Make sure the SCSI ID does not duplicate with that of other SCSI devices.

  - Step 4
    Press the Enter button to confirm the SCSI value or press ESC to cancel.

  - Step 5
    When completing the setting, restart the computer. Press any key to return to the menu on the LCD panel.

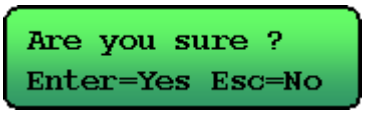
    

- **Create Volume**

  - Step 1
    Press the Function switch and use the Up and Down buttons to select Create Volume. Then press Enter.

  - Step 2
    Use the Up and Down, and Enter buttons to enter password. When finished, the following message will be displayed:

    Press Enter to confirm the setting or ESC to cancel.

  - Step 3
    You can further configure the volume with the following advanced options:

Advanced Setting	Description	Sub-menu
Volume ID	The ID number of logic volume	LUN 0 ~ LUN 7 (Logic Unit Number)
RAID Level	RAID level	NRAID, RAID 0, 1, 0+1, 3 and 5
Spare Disks	Spare disks of EvoStor	Select spare disk
Data Disks	Data disks of EvoStor	Select data disks
Stripe Size	The size of striped block	4, 8, 16, 32, 64, and 128K
Create LUN Now	Create logic volume instantly	Yes or No

    Use the Up and Down buttons to select the configuration item and press Enter to proceed to the sub-menu.

  - Step 4
    Use the Up and Down buttons to select the value and press Enter to confirm.

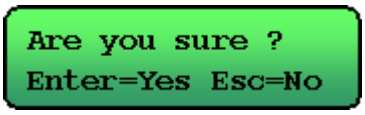
  - Step 5
    When finished, restart the computer. Press any button to return to the menu.

- **Delete Volume**

  - Step 1
    Press the Function switch and use the Up and Down buttons to select Delete Volume. Press Enter to proceed.

  - Step 2
    Use the Up and Down, and the Enter buttons to enter the password.
    When finished, the following message will be displayed on the LCD panel:

  - Step 3
    Use the Up and Down buttons to select the appropriate option. Then press Enter to confirm.

  - Step 4
    Press Enter to confirm and return to the main menu or press ESC to cancel.

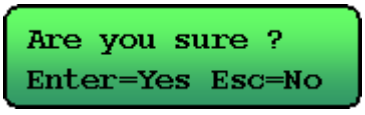
    

- **Set Clock Timer**

  - Step 1
    Press the Function switch, and Up and Down buttons to select Set Clock Timer. Then press Enter to proceed:

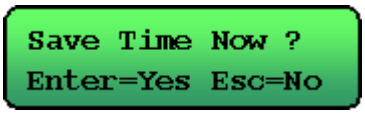
  - Step 2
    Use the Up and Down, and the Enter buttons to enter the password.
    When finished, the following message will be displayed:

    Press Enter to confirm or ESC to exit.

  - Step 3
    Set the time and press Enter to confirm.

➢ Step 4
Press Enter to save the time or ESC to exit.



- **Change Password**

➢ Step 1
Press Enter and the Up and Down buttons to select Change Password. Then press Enter to proceed.

➢ Step 2
Enter the password. The following message will be displayed on the LCD panel:

Press Enter to confirm or ESC to exit.

➢ Step 3
Enter the new password and press Enter.

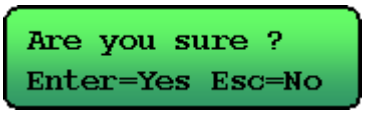
➢ Step 4
Press Enter to save the new password or ESC to exit.

- **Restore Configuration**

  - Step 1
    Press the Function button and select Restore Config.

  - Step 2
    Enter the password and Press Enter to confirm.

  - Step 3
    Wait for the system to restart.

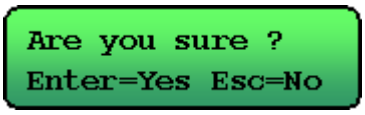
    Note: The password will not be restored when selecting restoring configuration. To restore the password to default, refer to Chapter 5.5.

- **Restart System**

  - Step 1
    Press the Function switch and select Restart System. Press Enter to confirm.

  - Step 2
    Enter the password and press Enter to confirm. To quit, press ESC.

  - Step 3
    Wait for the system to restart.

- **Shut down System**

  - Step 1
    Press the Function switch and select Shutdown System. Then press ESC to proceed.

  - Step 2
    Enter the password and press Enter to confirm.

  - Step 3
    The system will shut down and the following message will be shown.

3.2 Using EvoStor Management Utilities

Besides configuration via the LCD panel, you can also configure EvoStor via the management utilities included in the companion CD. The utilities are:

- **EvoStor Manager**

  EvoStor Manager is a GUI software which provides system monitoring and configuration functions via the Internet. Make sure EvoStor Agent has been run before running EvoStor Manager.

- **EvoStor Agent**

  EvoStor Agent works as a communication means between EvoStor and EvoStor Manager. It receives management request from EvoStor Manager in the Internet and transfers the request to SCSI command of EvoStor to provide remote management and monitoring functions.

- **EvoStor ActiveX Control**

  EvoStor ActiveX Control is a standard ActiveX control using Microsoft® ActiveX and Component Object Model (COM) technology. This ActiveX control provides an interface for web page script or other OLE control container programs to use the functions of EvoStor Manager. For further information, please refer to section 3.2.3.

3.2.1 EvoStor Management Software (EvoStor Manager)

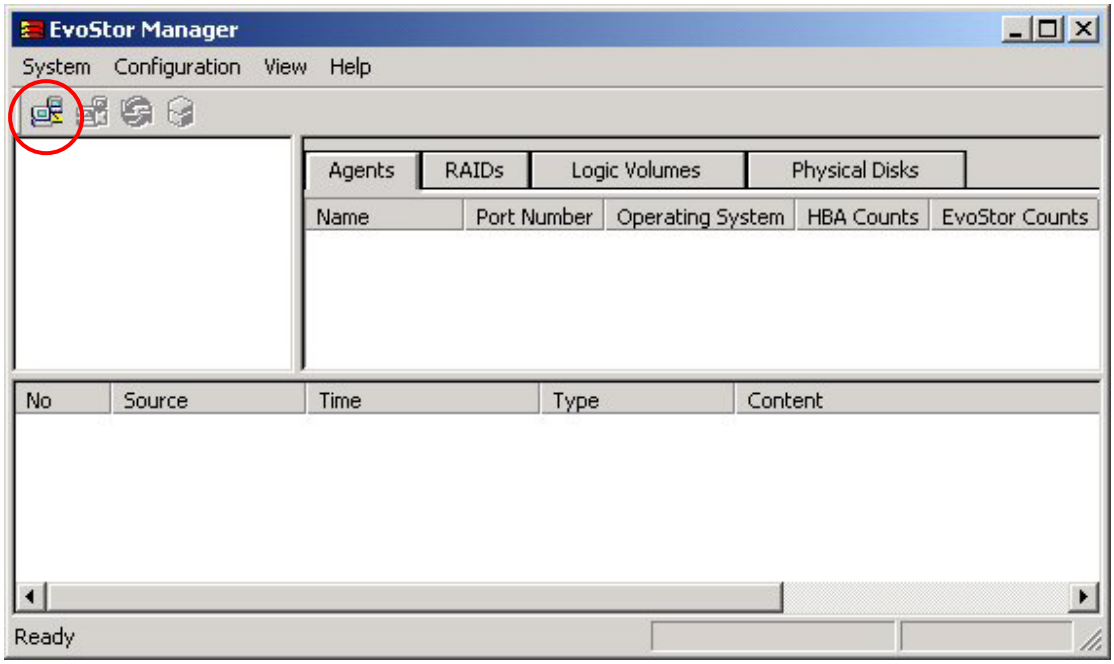
1. Run Install EvoStor Manager in the companion CD.

2. Follow the instructions to complete the installation. When finished, a shortcut 

will be created on the desktop.

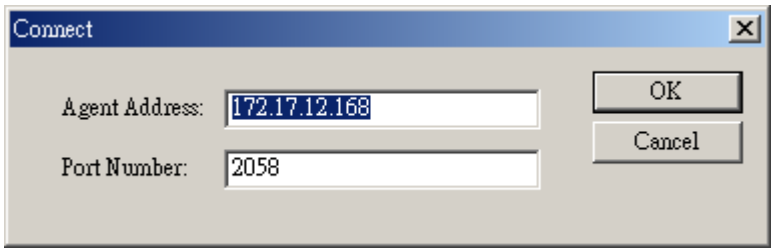
- **Using EvoStor Manager**

  Run EvoStor Manager, the following screen will pop up. Click the Connect icon  or select Connect in System.



Enter the agent address, e.g. 172.17.12.168 and port number (default value: 2058). Then click OK.

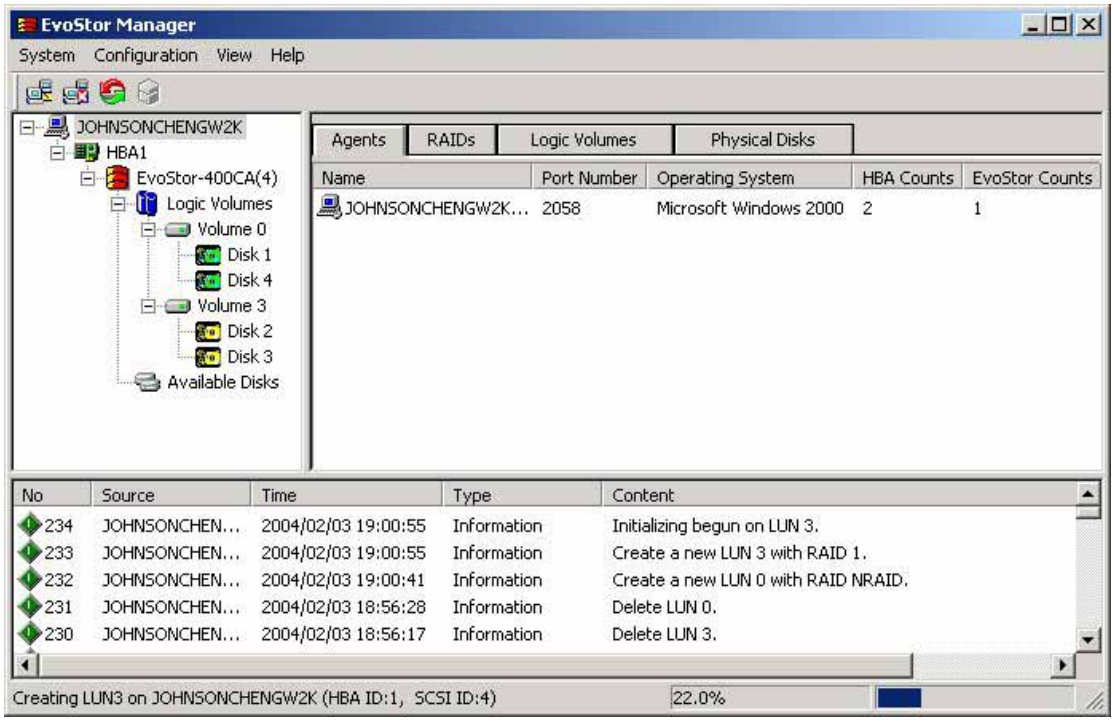
Note: The port number must be the same as that preset by EvoStor Agent for successful connection. For further details on port number configuration of EvoStor Agent, please refer to Chapter 3.2.2.



Note: The port number for EvoStor Manager must be the same as that for EvoStor Agent for successful connection.

- **Monitoring Page Overview**

Upon successful connection, the following screen will be displayed:

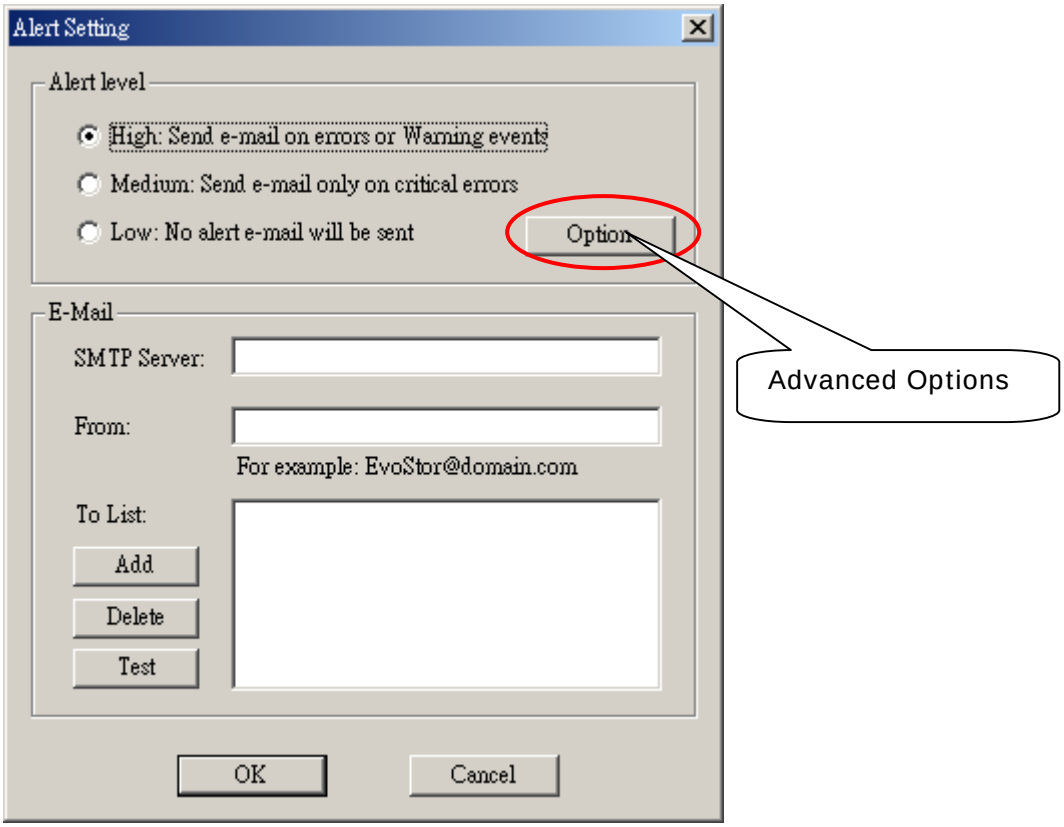


Four options in the main menu:

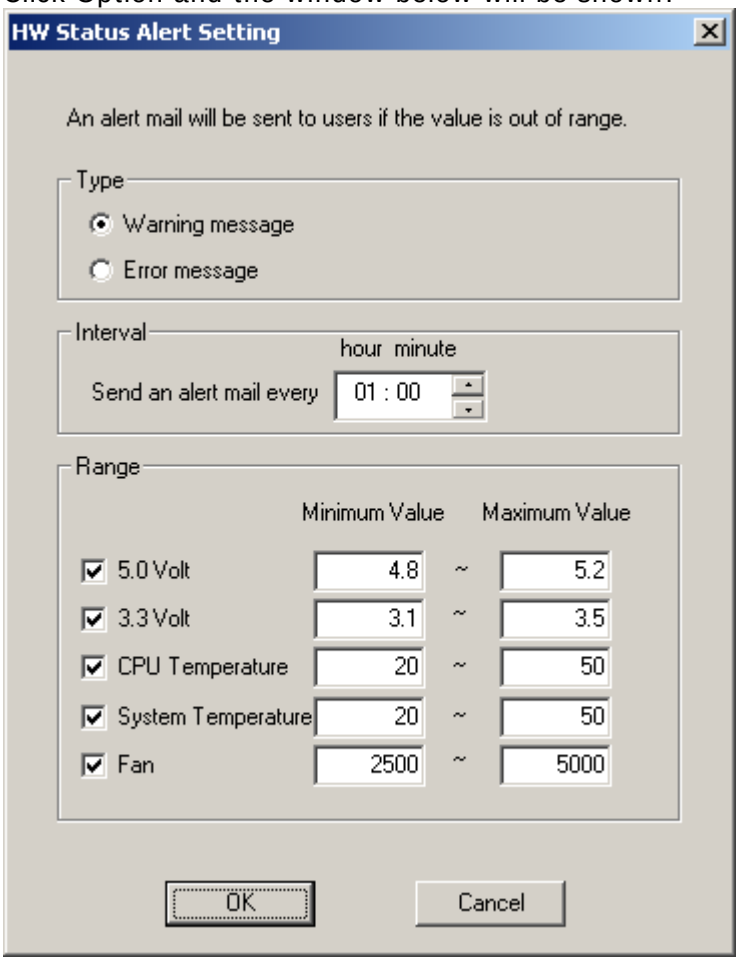
1. System

Manager Menu Options

- ✓ Connect: To establish connection with EvoStor.
- ✓ Disconnect: To disconnect from EvoStor.
- ✓ Alert Setting: To specify the alert level for sending notification email and the recipients.



Click Option and the window below will be shown:



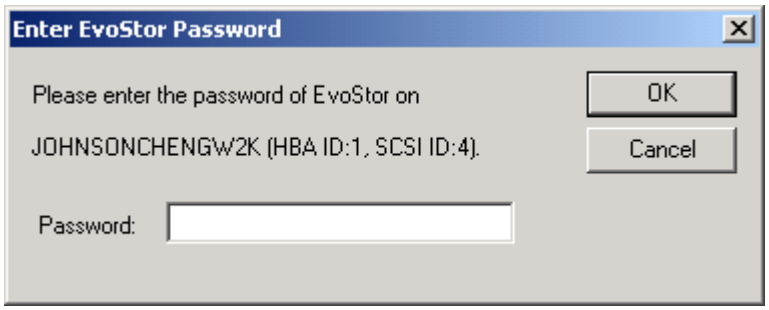
Field	Option
Type	Alert type: warning or error messages.
Interval	Time interval for sending an alert mail.
Range	Monitoring items and the safety range, including voltage, CPU temperature (℃), system temperature (℃), and fan speed.

Alert emails will be sent to particular recipients when the values of the items being monitored are out of the safety range.

- ✓ Upgrade Firmware: To upgrade the firmware version.
- ✓ Rescan: Enable this option to detect the status of connection to Agent.
- ✓ Save Log As: To back up event logs.
- ✓ Clear All Logs: To clear all event logs.
- ✓ Exit: To exit the monitoring page and EvoStor Manager.

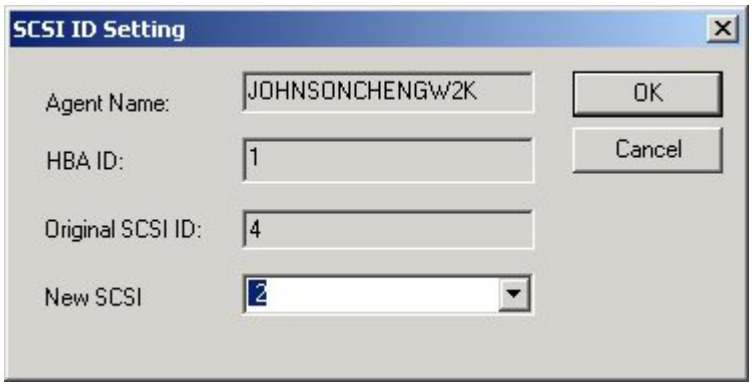
2. Configuration

A password must be entered when modifying any setting in Configuration. The default password is 8 empty characters. Hence, you can press Enter directly.



The options include:

- ✓ SCSI ID Setting: Set SCSI ID.

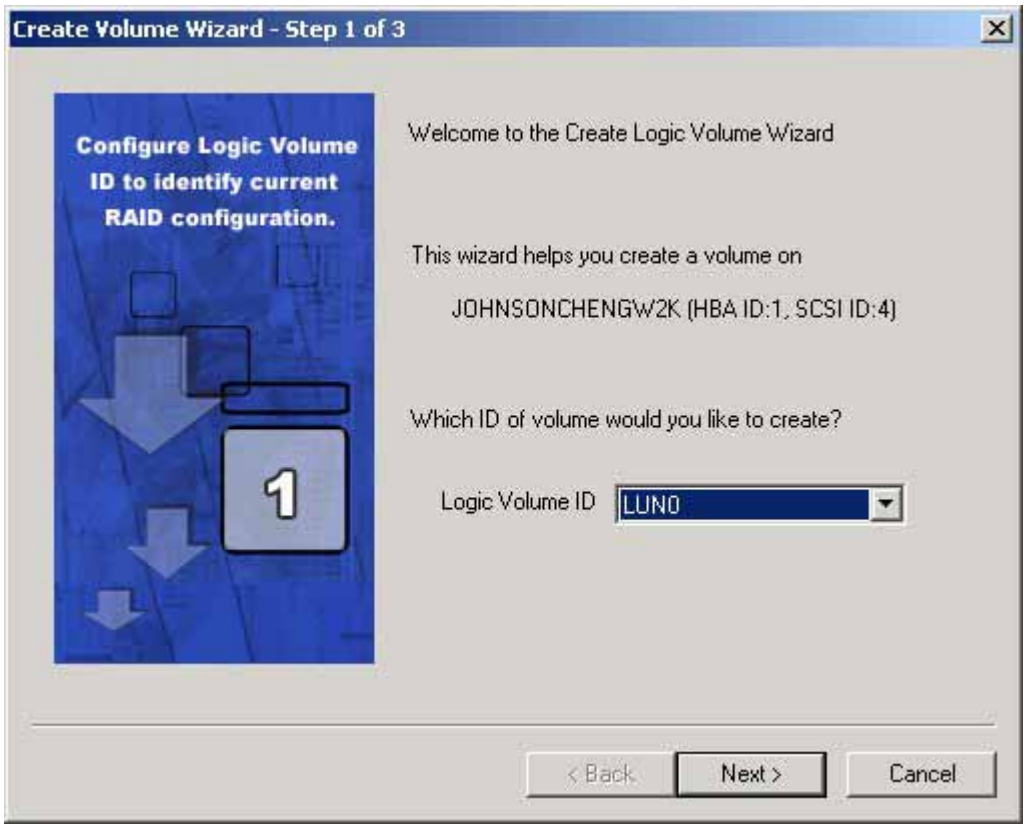


✓ Create Logic Volume

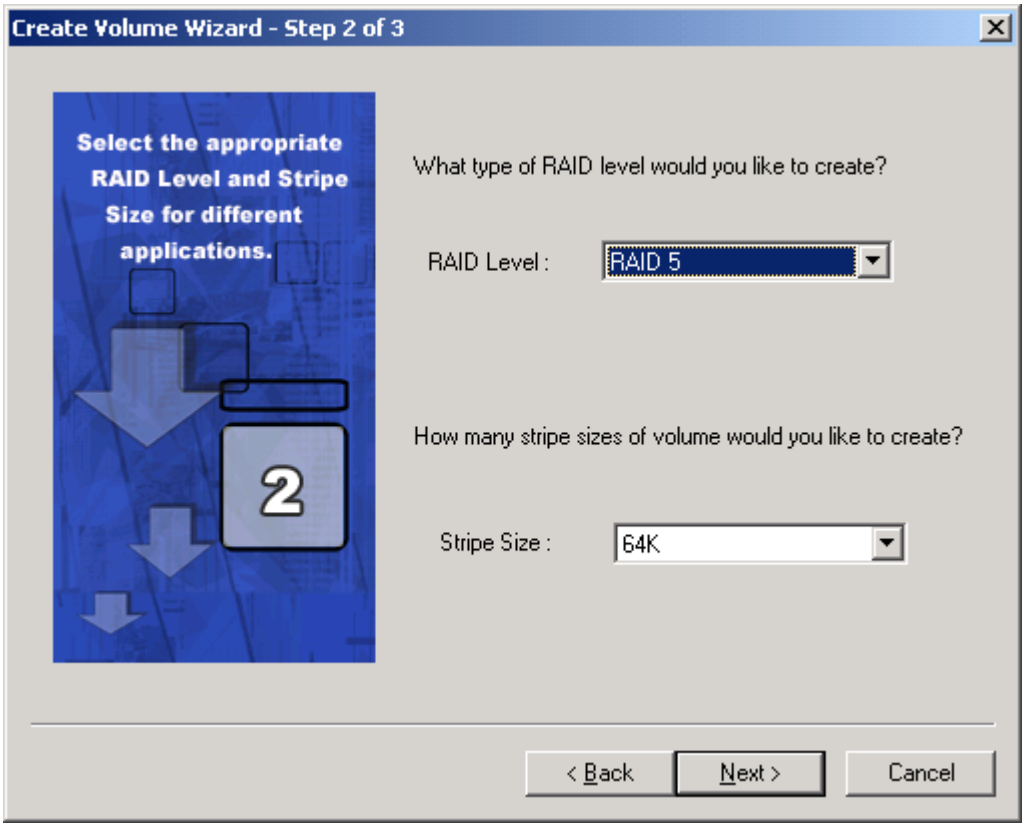
Follow the steps below to create logic volume for EvoStor:

➢ Step 1
Select logic volume ID.

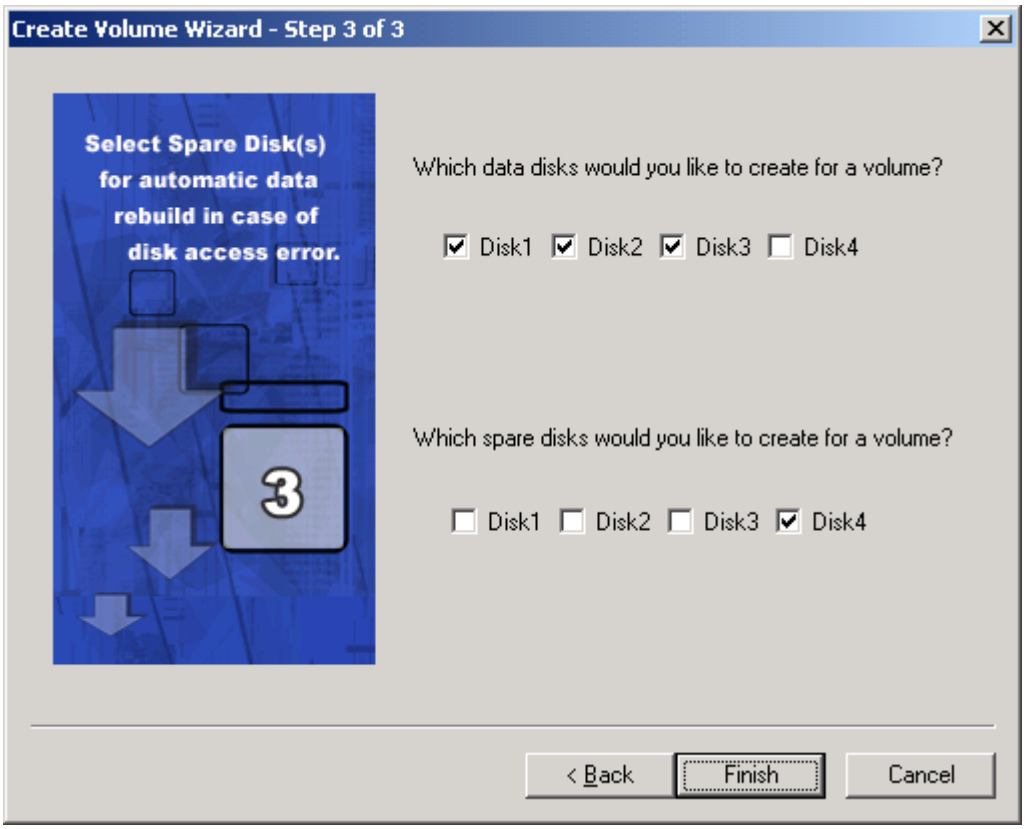
Note: Please select LUN0 as the ID for EvoStor, as some O.S. are not able to recognize logic volume ID other than LUN0. For information about creating more than one logic volume, please contact the O.S. distributor.



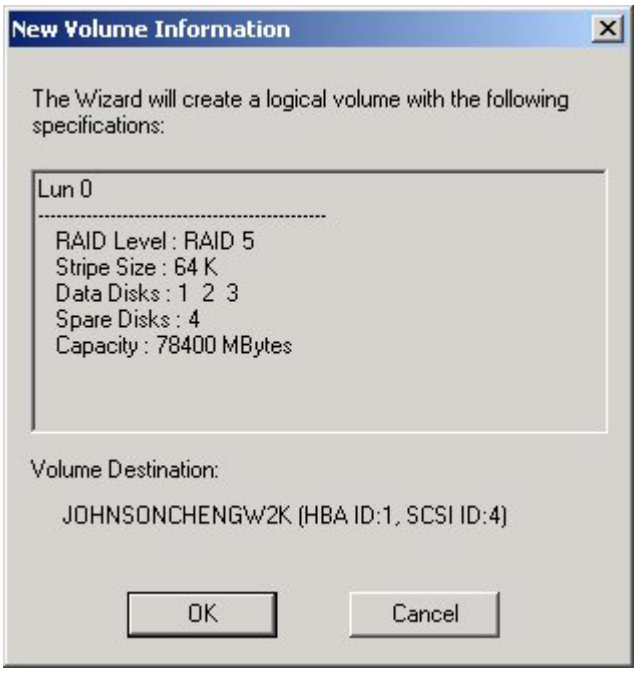
➢ Step 2
Select the RAID level and stripe size to create for EvoStor.



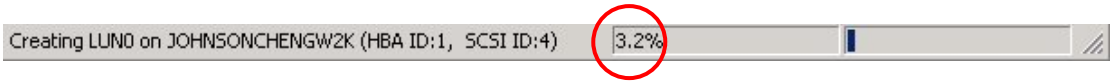
➢ Step 3
Select the data and spare disk(s) to create for a volume. Then click Finish.



When finished, the following screen will be shown to display new volume information.



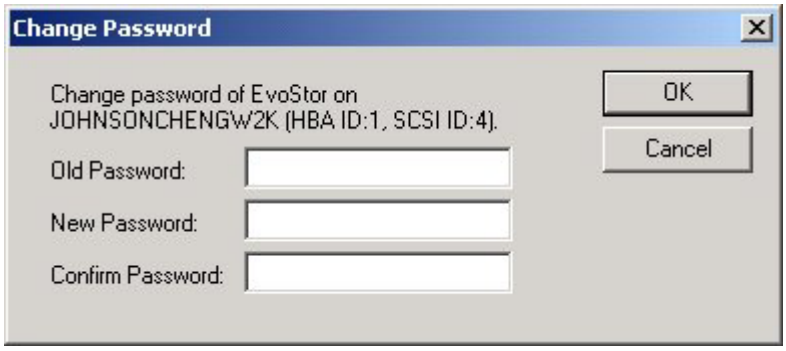
➢ Step 5
When the system is being configured and begins to initialize logic volumes, the number of percentage for initialization will be displayed on the tool bar.



Field	Option
Logic Volume	Select logic volume (LUN 0 ~ 7)
Member Disks	Spare Disks: Configure spare disks
	Data Disks: Configure data disks

✓ Delete Logic Volume: To remove logic volume.

✓ Change password: To change password.

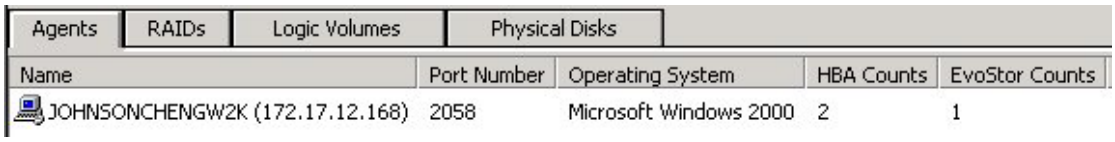


3. View

Select the items for viewing in Manager Menu.

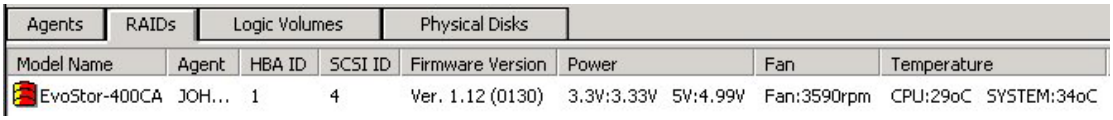
Available options include:

✓ Agents:



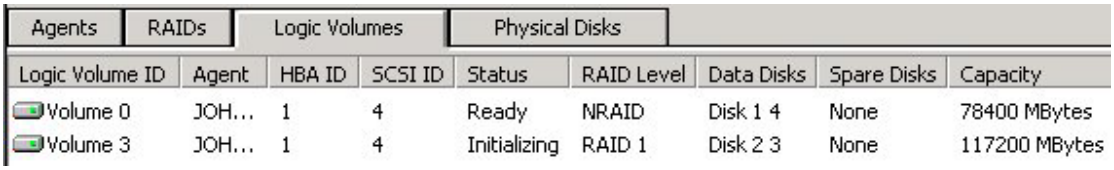
Field	Description
Name	The server name running EvoStor Agent.
Port Number	The TCP port number for Manager/Agent connection.
Operating System	The OS of the server running EvoStor Agent.
HBA Counts	The number of ASPI interface cards supported by the server.
RAID Counts	The number of EvoStor connected to this agent.

✓ RAIDS:



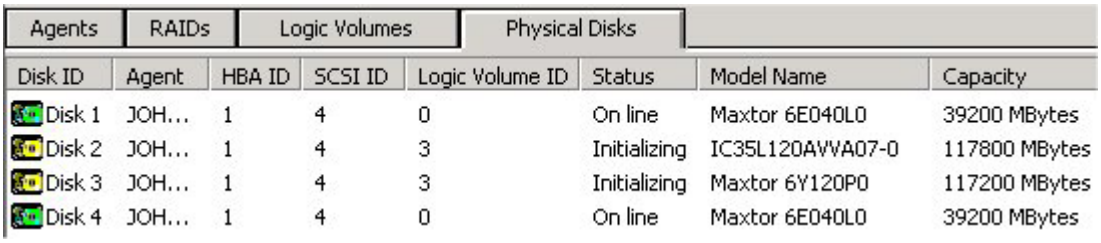
Field	Description
Model Name	EvoStor model
Agent	The server running EvoStor Agent
HBA ID	The ID of SCSI adaptor connected by EvoStor
SCSI ID	The SCSI ID of EvoStor
Firmware Version	EvoStor firmware version
Power	The voltage value of EvoStor 5V and 3.3V
Fan	Fan speed
Temperature	The CPU temperature and system temperature of EvoStor.

✓ Logic Volumes:



Field	Description
Logic Volume ID	The ID number of logic volume
Agent	The server running EvoStor Agent
HBA ID	The ID of SCSI adaptor connected by EvoStor
SCSI ID	The SCSI ID of EvoStor
Status	Status of EvoStor: ● Degrading ● Initializing ● Ready ● Rebuilding ● Error
RAID Level	RAID level configured for EvoStor
Data Disks	The data disk ID number of EvoStor
Spare Disks	The spare disk ID number of EvoStor
Capacity	The capacity of logic volume

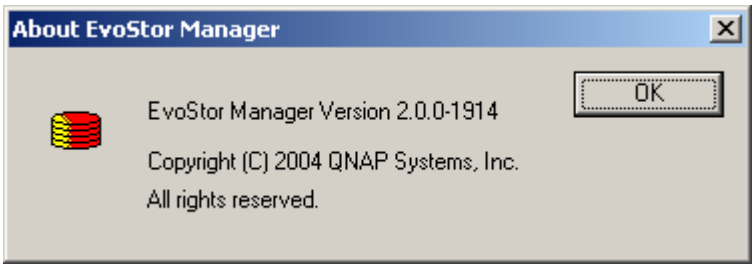
✓ Physical Disks



Field	Description
Disk ID	The slot ID of ATA hard disk
Agent	The server running EvoStor Agent
HBA ID	The ID of SCSI adaptor connected by EvoStor
SCSI ID	The SCSI ID of EvoStor
Logic Volume ID	The logic volume ID of EvoStor
Status	Status of ATA hard disk: ● Degrading ● Error ● Initializing ● On line ● Off line ● Rebuilding ● Vacant
Model Name	The model name of ATA hard disk
Capacity	The disk capacity of ATA hard disk

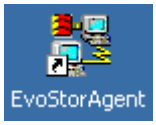
4. Help

The version number of EvoStor Manager will be shown:



3.2.2 EvoStor Agent

1. Run Install EvoStor Agent in the companion CD.

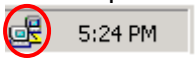
Follow the instructions to complete the installation. A shortcut 

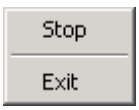
will be created on the desktop.

Note: You will be prompted to install ASPI (Advanced SCSI Programming Interface) if it has not been installed to the PC. Restart the PC after installation. For further details, please refer to Appendix A.

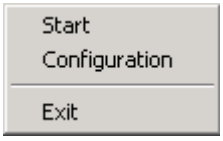
- **Using EvoStor Agent**

  When EvoStor Agent is installed, it will be run every time when Windows starts up. An icon will be created in the toolbar.

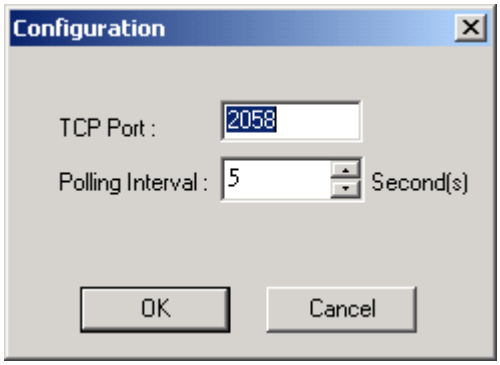
  Right click the icon and choose to stop or exit EvoStor Agent. 

  - Stop: Stop the functions of EvoStor Agent. The communication and processing between EvoStor Agent and EvoStor will stop. Right click the mouse and a list will be displayed:

i. Start: To restart EvoStor Agent. EvoStor Agent will accept and process the commands between EvoStor Manager and EvoStor.

ii. Configuration: To configure the parameters of EvoStor Agent. The available parameters are shown in the following screen:



TCP Port: The TCP port number for EvoStor service. The default value is 2058. Make sure the port number is the same as the one entered for EvoStor Manager connection.

Polling Interval: The time interval for EvoStor Agent to inquire RAID status. The default value is 5 seconds. Setting the time interval to close affect system performance.

iii. Exit: Shut down EvoStor Agent. The agent icon will be removed from the toolbar. You need to run the agent again from the desktop.

- Exit: Same as the above exit function.

3.2.3 EvorStor View ActiveX Control

- **Introduction**

  EvoStor View ActiveX Control is a standard ActiveX control using Microsoft® ActiveX and Component Object Model (COM) technology. This ActiveX control provides an interface for web page script or other OLE control container programs to use the functions of EvoStor Manager. Instead of monitoring disk array status provided by EvoStor Manager, this ActiveX control can help easily build your own manager application or manager web page.

- **System Requirements**

  PC: IBM or IBM-compatible PC.
  Operation system: Windows 98 SE, Windows ME, Windows 2000, or Windows XP.

- **Installation Instruction**

  Run "Install EvoStor ActiveX Control" from companion CD to install the software. After the setup program complete, all files will be installed to: " [Program Files] \QNAP\EvoStorActiveX\"

Note: [Program Files] is the path of Windows Program Files folder. The typical path is "C:\Program Files". The setup program also creates a shortcut of a demo html file. You can open it to see if this ActiveX control has been installed correctly.

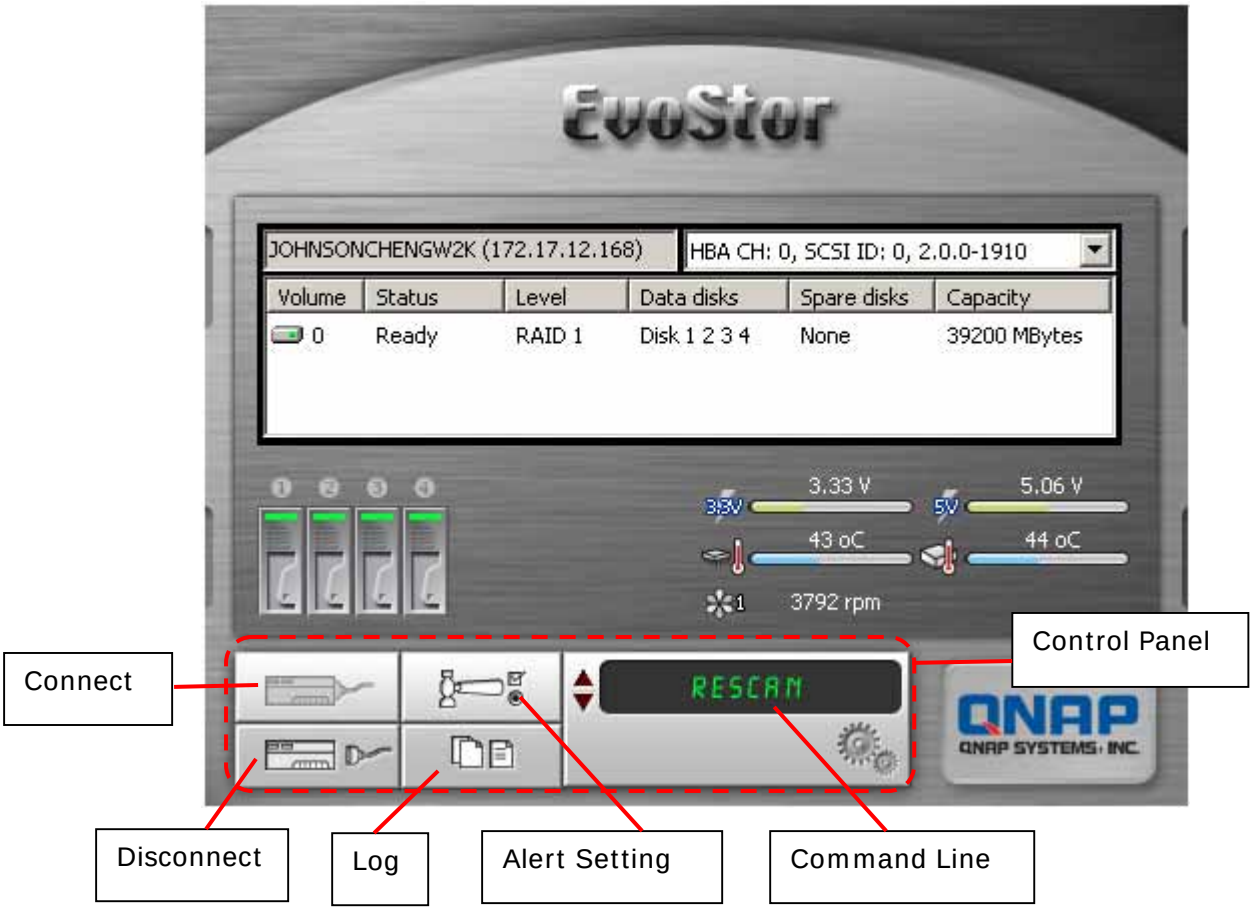
- **Un-installation Instruction**

  To remove EvoStor ActiveX control, follow the steps below:

  i. Open the Control Panel by choosing Settings from the Start Menu.
  ii. Select "Add/Remove Program" and choose "EvoStor ActiveX Control" from the list.
  iii. Click on the "Add/Remove" button and follow the instructions to uninstall the program.

- **Usage**

  Open “EvoStorDemo.htm” in a web browser to see this ActiveX control in an html file. Click on the “Connect” button and input the IP address and IP port of EvoStor Agent, of which the EvoStor is on.



EvoStor View ActiveX Control resides in Control Panel. You can manipulate most of EvoStor’s functions by using the buttons and Windows controls on it. The functions and commands available are listed below:

Connect
Connect an EvoStor Agent to manage EvoStor.

Disconnect
To disconnect EvoStor Agent.

Alert Setting
After you click this button, an alert setting dialog box will pop up and prompt you to configure alert email and hardware status settings.

Command Line
Use the Up/Down key to select a command and click this button to execute it.

Log
After you click this button, an event log dialog box will pop up and prompt you for filename to store the event logs.

- **Object Interface**

EvoStor View ActiveX Control uses the concept of objects to expose programming functions. You can configure EvoStor or other monitoring functions of EvoStor Manager by issuing a simple programming statement. The complete list of the programming interface is described in the following section “Object Interface List”.

- **Web Support**

To let users distribute ActiveX control on their own web page to manage EvoStor. Here is an HTML page example as following:

```
<HTML>
<BODY>
<OBJECT
        ID=”EvoStorViewCtrl”
    CLASSID=”CLSID:31AA7BDE-2F5D-4845-A4CD-014BD9FA9B5C”
    HEIGHT=400
    WIDTH=491>
</OBJECT>
</BODY>
</HTML>
```

- **Object Interface List**

Methods		
[Name]	**[Param]**	**[Note]**
BOOL Connect()		Pop up a dialog for inputting IP address and IP port of EvoStor Agent to establish a connection to an EvoStor Agent
BOOL Connect(LPCTSTR pszAgentAddr, short sAgentPort)	pszAgentAddr: IP address of EvoStor Agent sAgentPort: IP port of EvoStor Agent	Establish a connection to a specified IP address and IP port of EvoStor Agent
BOOL DisConnect()		Disconnect from EvoStor Agent
BOOL CreateLun()		Pop up a create volume wizard to create a

		volume on the specified EvoStor
BOOL DeleteLun()		Delete a volume from a specified EvoStor
BOOL ChangeSCSIID()		Pop up a dialog to change the SCSI ID of a specified EvoStor
BOOL ChangePasswd()		Pop up a dialog to change the password of a specified EvoStor
void Rescan()		Rescan all SCSI bus on all host adapters, and identify the EvoStor devices available on the SCSI bus
void AlertSetting()		Pop up a dialog to set alert configuration
BOOL UpgradeFirmware()		Upgrade firmware on a specified EvoStor

Events		
[Name]	**[Param]**	**[Note]**
void EventLog(BSTR pszOwner, short sType, BSTR pszTime, BSTR pszContent)	pszOwner: Which EvoStor send out the event log sType: 1(Debug), 2(Error), 3(Warning), 4(Information) pszTime: The time of event log occurs pszContent: The content of event log	Fired when an event takes place for EvoStor
Void SocketClosure()		Fired when receiving notification of socket closure

Examples:

```
CRaidView m_RAIDViewCtrl;
m_RAIDViewCtrl.Connect();                    // Connect to EvoStor Agent
m_RAIDViewCtrl.Rescan();                     // Rescan EvoStor devices on all
SCSI bus
m_RAIDViewCtrl.AlertSetting()          // Set alert configuration
m_RAIDViewCtrl.CreateLun();            // Create a logic volume on EvoStor
m_RAIDViewCtrl.DeleteLun();            // Delete a logic volume on EvoStor
m_RAIDViewCtrl.UpgradeFirmware();      // Upgrade firmware of EvoStor
m_RAIDViewCtrl.ChangeSCSIID();               // Change SCSI ID of EvoStor
m_RAIDViewCtrl.ChangePasswd();               // Change password of EvoStor
m_RAIDViewCtrl.DisConnect();           // Disconnect
```

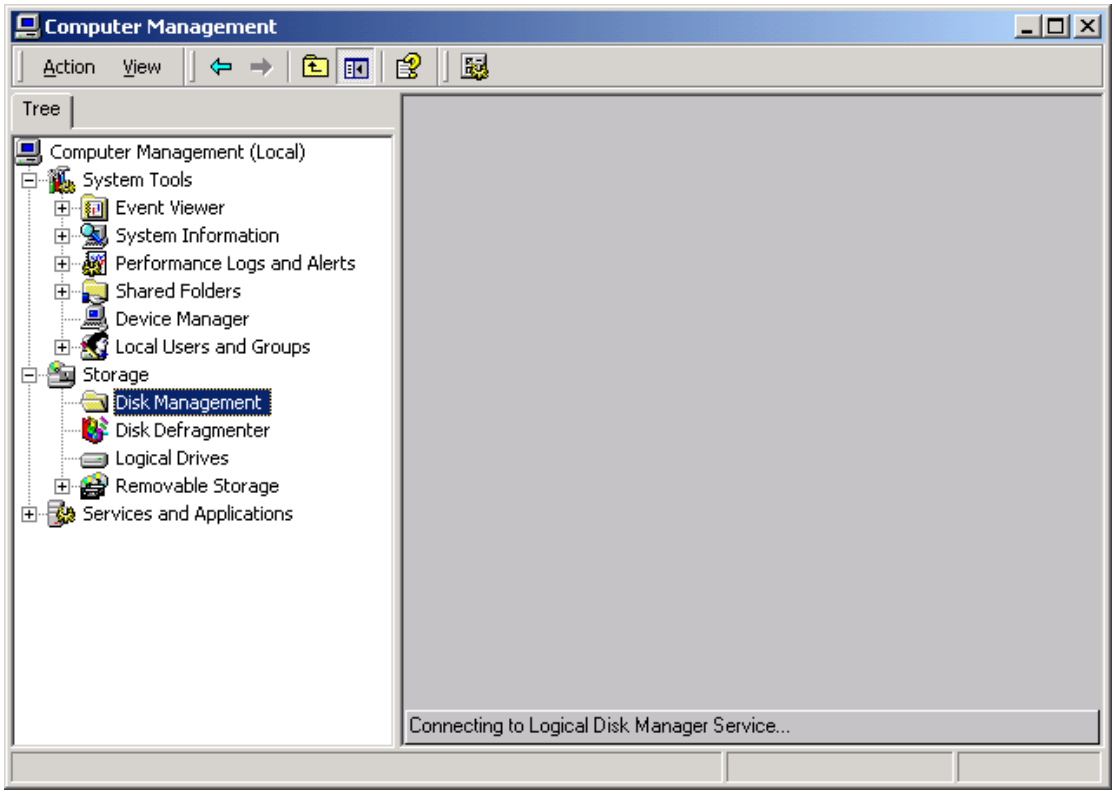
Chapter 4 Accessing EvoStor

EvoStor emulates a standard SCSI-3 direct access device (hard disk) to host, it is compatible with all SCSI-3 or SCSI-2/LVD host adapters, so no special access software for specific operating system is required. Like any other type of fixed disk media in your system, a RAID must also be partitioned and formatted before use. The method of partitioning and formatting on a RAID is the same as that for other disks. The following sections provide a brief overview on how to access EvoStor in Windows 2000 and Red Hat Linux operating system. For other operating system, please contact your operating system supplier for further information.

4.1 Using Microsoft Windows 2000

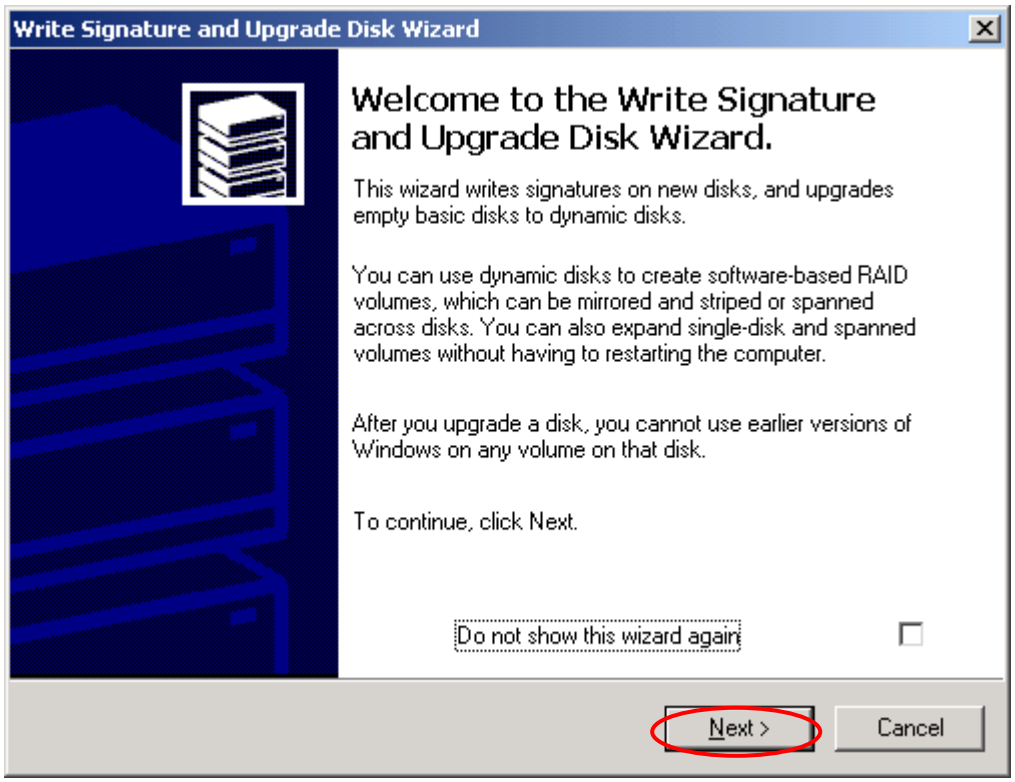
i. Detecting new drive

Right click My **Computer** on the desktop and select **Manage**. Select **Disk Management** when the following screen pops up, the computer will detect the new logical disk. If there is an existing hard disk, the newly detected one will be numbered as disk 1.

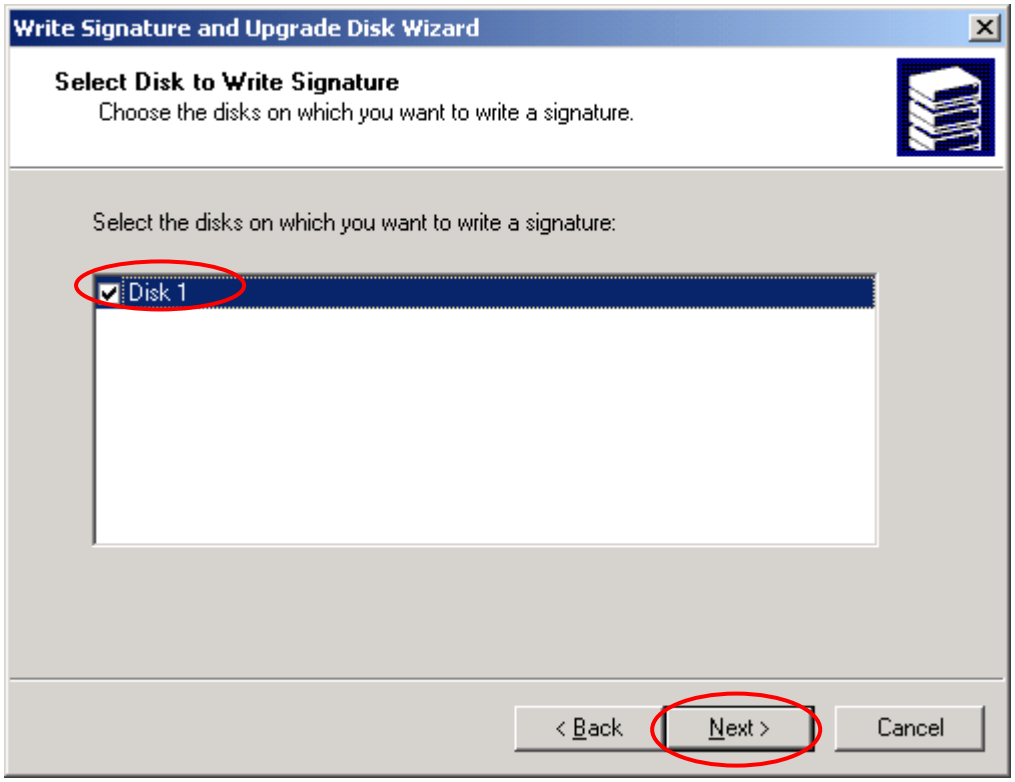


ii. Writing Signature

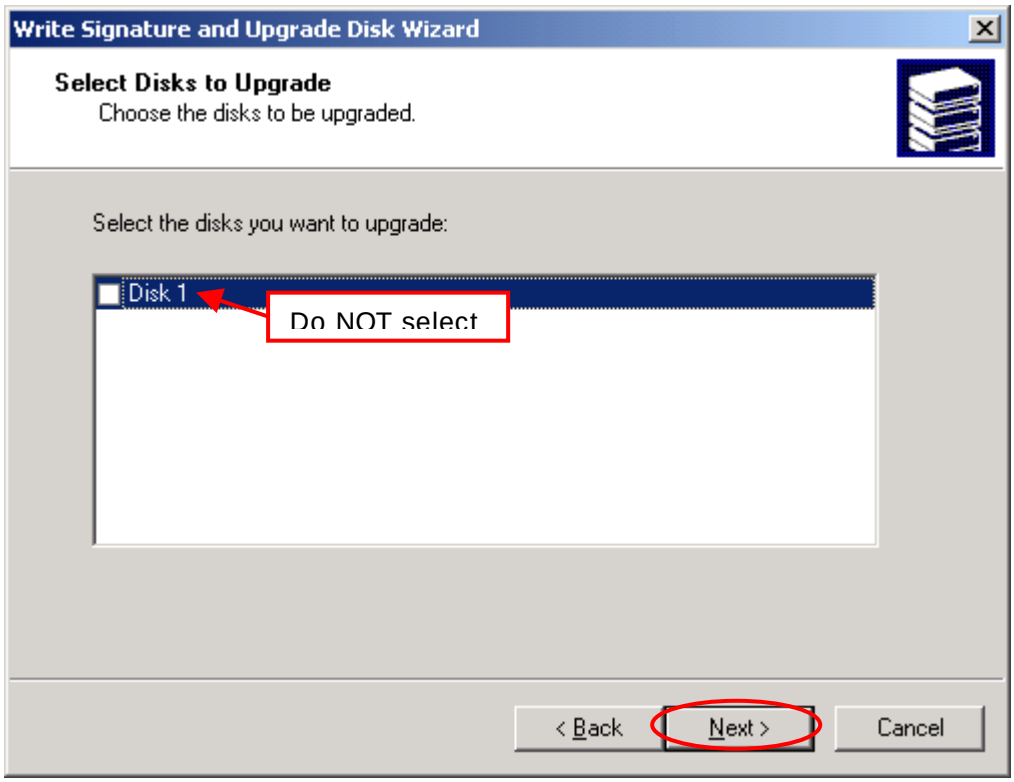
Before using new disk, the host computer will prompt for writing signature for the newly detected disk. Click **Next** to proceed.



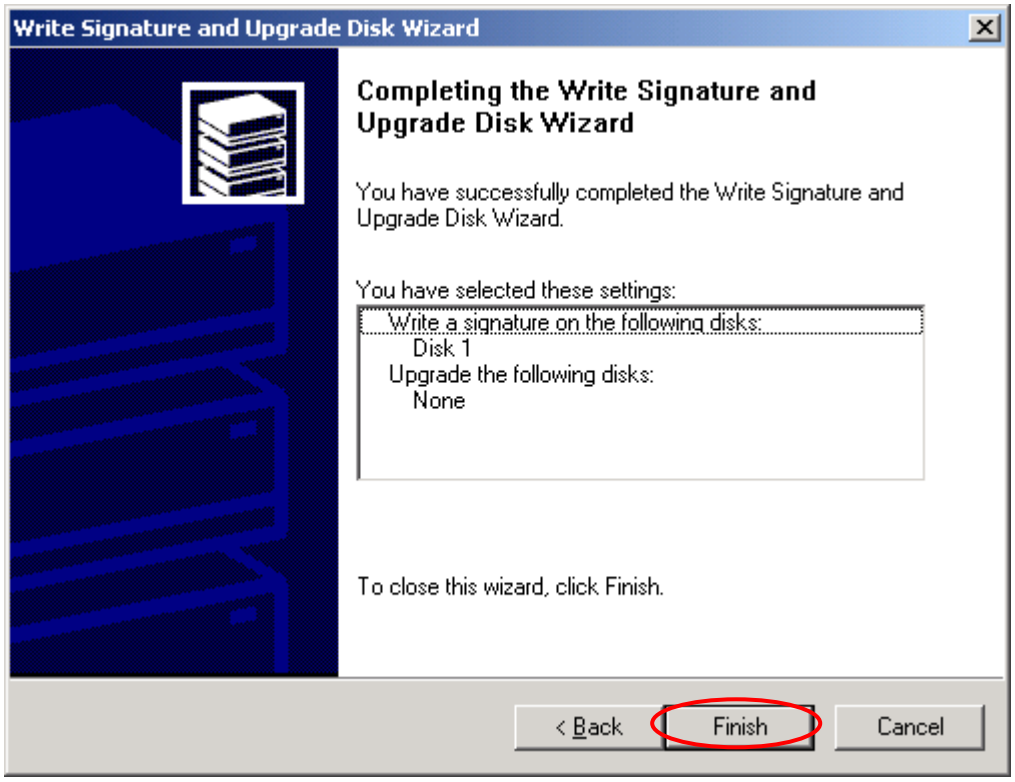
iii. The following example is based on Disk 1. Select Disk 1 and click **Next**.



iv. Click **Finish** to complete writing signature for Disk 1. Do not select to upgrade the disk.



v. Click **Finish** to complete.



vi. Creating disk volume.

Right click the newly detected disk and select **Create Volume**.